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ABSTRACT

This curriculum guide provides materials for teachers to use in developing a 1-year course in general mechanical repair as part of the trade and industrial education curriculum. The guide contains the following: (1) essential elements common to all trade and industrial courses; (2) an instructional delivery outline (teaching sequence) for the course, containing the various sections, units, and topics of instruction; listing the essential elements covered in each topic; identifying instructional materials; and recommending hours of instruction for each unit of instruction; (3) objectives for each unit and the specific objectives to be met upon completion of each topic; (4) suggested resources; and (5) an appendix--modification techniques for special populations. The course is divided into four basic sections of instructional materials. The first section covers the common essential elements for trade and industrial elements; the remaining sections cover minor automotive maintenance, small engine repair, and welding. Extensive matrices link lesson plan topics with mathematics, science, language arts, social studies, and Texas curriculum objectives. (KC)

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Curriculum Guide

General Mechanical Repair 2

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General Mechanical Repair 2

Curriculum Guide

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To ensure educational equity, this material has been reviewed to eliminate bias or stereotyping.

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PREFACE

The Educational Development and Training Center at East Texas State University is striving to provide needed materials to vocational instructors within the state.

The purpose of this publication is to assist instructors in improving instruction. As these materials are used, it is hoped that student performance will improve and students will be better prepared to assume a role in the field of General Mechanical Repair.

Instructional materials in this publication are written in terms of student performance, using measurable objectives. This approach augments the teaching-learning process. Criterion-referenced evaluation instructions are provided for uniform measurement of student progress. In addition to evaluating recall information, teachers are encouraged to evaluate the other areas, including progress and the finished product.

The instructor should, where appropriate, reinforce the application of basic academic skills. For example, when addressing the area of study, the instructor should stress to students that they will be applying specific mathematical skills such as addition, subtraction, multiplication, and division that they have learned in previous academic courses. Effective teaching practices research, and consequently the Texas Teacher's Appraisal System, emphasizes the relationship of new learning to prior or future learning. In some cases, specific academic skills needed to complete job tasks may not have yet been addressed in the academic courses in which the students have been enrolled. If this is the case, the vocational instructor should introduce and explain the academic skills, and collaboratively work with the appropriate academic teachers. Students should then achieve a level of mastery that will allow them to perform the job tasks. Instructors of vocational courses are encouraged to work closely with instructors of academic courses to ensure that students are taught fundamental academic principles correctly.

Every effort has been made to make this publication basic, readable, and by all means, usable. Three vital areas of instruction (motivation, personalization, and localization) are not included in this publication; however, they should be capitalized on by the instructor. Only then will this publication really become a vital part of the teaching-learning process.

General Mechanical Repair 2
Matrix

Because it is imperative our future work force be able to compete in an increasingly global economy, students enrolled in vocational education courses must acquire academic knowledge and skills as well as the occupationally specific knowledge and skills.

In preparing the General Mechanical Repair Matrix, EDTC staff analyzed the lesson plans to determine where academic principles were applied. The matrix was then designed to correlate specific lesson plans to the essential elements of mathematics, science, language arts, and social studies and the objectives of the Texas Assessment of Academic Skills (TAAS). It is hoped this matrix will assist educators in integrating vocational and academic education so that relevancy for learning can be established.

Texas Assessment of Academic Skills
Instructional Targets
Language Arts

DOMAIN: **Reading Comprehension**

Objective 1: The student will determine the meaning of words in a variety of written texts.

Objective 2: The student will identify supporting ideas in a variety of written texts.

Objective 3: The student will summarize a variety of written texts.

Objective 4: The student will perceive relationships and recognize outcomes in a variety of written texts.

Objective 5: The student will analyze information in a variety of written texts in order to make inferences and generalizations.

Objective 6: The student will recognize points of view, propaganda, and/or statements of fact and nonfact in a variety of written texts.

Texas Assessment of Academic Skills
Instructional Targets
Mathematics

DOMAIN: Concepts

Objective 1: The student will demonstrate an understanding of number concepts.

Objective 2: The student will demonstrate an understanding of mathematical relations, functions, and other algebraic concepts.

Objective 3: The student will demonstrate an understanding of geometric properties and relationships.

Objective 4: The student will demonstrate an understanding of measurement concepts using metric and customary units.

Objective 5: The student will demonstrate an understanding of probability and statistics.

DOMAIN: Operations

Objective 6: The student will use the operation of addition to solve problems.

Objective 7: The student will use the operation of subtraction to solve problems.

Objective 8: The student will use the operation of multiplication to solve problems.

Objective 9: The student will use the operation of division to solve problems.

DOMAIN: Problem Solving

Objective 10: The student will estimate solutions to a problem situation.

Objective 11: The student will determine solution strategies and will analyze or solve problems.

Objective 12: The student will express or solve problems using mathematical representation.

Objective 13: The student will evaluate the reasonableness of a solution to a problem situation.

Texas Assessment of Academic Skills
Instructional Targets
Written Communication

DOMAIN:	**Written Communication**
Objective 1:	The student will respond appropriately in a written composition to the purpose/audience specified in a given topic.
Objective 2:	The student will organize ideas in a written composition on a given topic.
Objective 3:	The student will demonstrate control of the English language in a written composition on a given topic.
Objective 4:	The student will generate a written composition that develops/supports/elaborates the central idea stated in a given topic.
Objective 5:	The student will recognize appropriate sentence construction within the context of a written passage.
Objective 6:	The student will recognize appropriate English usage within the context of a written passage.
Objective 7:	The student will recognize appropriate spelling, capitalization, and punctuation within the context of a written passage.

Academic Courses' Essential Elements

English Language Arts: 75. 61

1.	(b)(4)(A)	Expand vocabulary
2.	(c)(4)(F)	Follow complex directions
3.	(d)(1)(A)	Use the composing process to plan and generate writing
4.	(d)(4)(G)	Use various reference materials
5.	(e)(2)(D)	Use oral language in a variety of situations

Mathematics: **75.63**

1.	(a)(1)(A)	Identify and use appropriate units of measure
2.	(a)(1)(B)	Solve problems involving measures
3.	(a)(1)(C)	Apply ratio and proportion
4.	(a)(3)(A)	Use the operations of addition, subtraction, multiplication, and division of whole numbers and integers in problem-solving situations
5.	(a)(3)(B)	Use fractions and their relative value
6.	(a)(3)(C)	Use the operations of addition, subtraction, multiplication, and division of fractions and decimals in problem-solving situations
7.	(a)(4)(A)	Compute income and wages
8.	(a)(4)(B)	Interpret deductions on paycheck stub
9.	(a)(4)(D)	Make budget
10.	(a)(4)(E)	Open and maintaining checking and savings account
11.	(a)(5)(C)	Measure
12.	(a)(5)(F)	Use graphs
13.	(a)(5)(G)	Use probability and statistics
14.	(a)(5)(H)	Work with personal finance
15.	(a)(6)(A)	Use counting methods and factorials
16.	(a)(6)(E)	Make predictions
17.	(b)(1)(A)	Interpret charts, tables, graphs and maps
18.	(b)(1)(C)	Determine wages and deductions from given information
19.	(b)(2)(A)	Find cost of: i. housing ii. food iii. transportation iv. clothing v. insurance

20.	(b)(2)(B)	Make decisions by comparing different types of the cost
21.	(b)(2)(C)	Find discounts, sales, rebates, coupons, etc.
22.	(b)(4)(A)	Investigate the use of credit cards and charge accounts
23.	(b)(4)(B)	Study options for loans
24.	(b)(5)(A)	Use banking forms
25.	(b)(5)(B)	Compare advantages and disadvantages of investments
26.	(b)(7)(A)	Calculate wages and deductions
27.	(b)(7)(B)	Develop a personal budget
28.	(c)(3)(B)	Use ratio and proportion
29.	(c)(3)(C)	Find percent and percentage
30.	(c)(3)(D)	Determine needs related to personal finance
31.	(c)(4)(C)	Use metric and customary units
32.	(c)(4)(D)	Find distance, perimeter, circumference, area, surface area and volume
33.	(d)(1)(A)	Develop the concept of measuring using measuring instruments
34.	(d)(1)(B)	Estimate measures
35.	(d)(4)(B)	Demonstrate a knowledge of similarity and similar figures
36.	(d)(4)(D)	Apply similarity to maps and scale drawings
37.	(d)(6)(C)	Find distance between points
38.	(d)(9)(B)	Compute circumference and area of circles
39.	(d)(10)(D)	Apply the formulas to practical problems related to capacity
40.	(g)(2)(B)	Understand symmetry
41.	(g)(2)(C)	Find area and volume
42.	(g)(3)(A)	Determine distance and betweeness
43.	(g)(3)(B)	Measure angles
44.	(i)(1)(A)	Understand aspects of free enterprise system and its benefits
45	(i)(1)(B)	Investigate wages and deductions
46.	(i)(1)(C)	Investigate benefits offered by companies, unions, and organizations
47.	(i)(1)(D)	Investigate Social Security and Income Tax
48.	(i)(2)(A)	Understand credit financing
49.	(i)(2)(C)	Investigate local bank services
50.	(i)(2)(E)	Investigate different types of loans
51.	(i)(2)(F)	Investigate types of institutions that offer loans
52.	(i)(3)(A)	Food, shelter, clothes
53.	(i)(3)(B)	Transportation
54.	(i)(3)(C)	Insurance
55.	(i)(3)(D)	Medical and dental expenses
56.	(i)(3)(E)	Education
57.	(i)(3)(F)	Retirement and annuities
58.	(i)(3)(G)	Miscellaneous
59.	(i)(4)(A)	Make informed consumer decisions
60.	(i)(4)(B)	Practice sound money management

Science:		75.64
1.	(b)(2)(A)	Observe chemical reactions
2.	(b)(4)(A)	Describe chemical processes
3.	(b)(4)(B)	Explain meaningful arrangements of chemical information
4.	(b)(5)(A)	Measure chemical quantities
5.	(c)(5)(A)	Measure physical quantities
6.	(c)(7)(B)	Compare the functions of electronic circuits
7.	(c)(7)(C)	Compare the electrical efficiency of appliances
8.	(c)(10)(A)	Apply principles of physics to an investigation
9.	(d)(2)(A)	Observe physical and chemical properties of matter
10.	(d)(2)(B)	Observe the effects of forces on matter
11.	(d)(2)(C)	Explore magnetic and electrical interactions
12.	(d)(9)(B)	Manage an experimental apparatus to test a physical science hypothesis
13.	(d)(10)(A)	Finalyze the use of chemicals in everyday activities of the home
14.	(f)(1)(A)	Demonstrate the safe use of laboratory chemicals and equipment
15.	(g)(5)(B)	Plot data on graphs and other displays
16.	(h)(7)(A)	Compare physical interactions under varied conditions
17.	(h)(7)(B)	Evaluate the electrical efficiency of machines
18.	(i)(2)(B)	Examine earth materials (construction)
19.	(l)	Marine Science (the EE's of our few marine related programs should be compared to those in this course)
20.	(n)(2)(B)	Study safety hazards encountered by students and methods of eliminating the hazards
21.	(n)(4)(A)	Communicate laboratory and safety directions
22.	(p)(l)(E)	Develop skills in using materials and devices in a manner that minimizes danger to self and to society and maintains an acceptable level of erosion of the environment (safety practices, waste disposal)
23.	(p)(2)(A)	Organize thought process to accomplish goals (applications of electronics, photography)
24.	(p)(2)(E)	Adjust constructively to variations in needs resulting from individual differences that exist both within and among cultures in a healthy society
25.	(p)(4)(D)	Consider the consequences of personal actions (safety, chemical disposal)
26.	(p)(4)(D)	Develop a sense of personal worth in doing things for pleasure as well as in doing for others (hobbies)

Note:		75.64(Q) and (R) relating to aerospace-aviation should be compared to T & I Aviation related course EE's.
	(q)(1)(B)	Demonstrate investigative procedures and techniques
	(q)(4)(A)	Describe emergency procedures
	(r)(7)(C)	Analyze radio navigation systems (will be in some electronics or media technology courses)

Social Studies **75.48**

1.	(a)(l)(A)	Respect beliefs of other individuals
2.	(a)(l)(D)	Recognize that individuals must accept the consequences of their decisions
3.	(a)(2)(A)	Respect the principles that underlie the Texas and the United States Constitutions, the Bill of Rights, and the Declaration of Independence
4.	(a)(2)(C)	Value open-mindedness, tolerance of differing opinions, and civic participation as important aspects of democratic behavior
5.	(a)(2)(D)	Respect the laws of one's society and work responsibly to change laws that one judges to be unjust
6.	(a)(2)(E)	Understand the importance of individuals participation in civic affairs
7.	(a)(2)(G)	Recognize the value of compromise in the democratic process
8.	(a)(2)(J)	Support the democratic processes of the republican form of government
9.	(a)(2)(K)	Support the basic values of American society (e.g., justice, responsibilities, freedom, respect for the law, diversity, privacy, private property rights, free enterprise, and voluntary exchange)
10.	(a)(2)(L)	Support the rules and laws of one's school, community, state, and nation
11.	(a)(3)(B)	Support the role of profit in the American market system
12.	(a)(3)(E)	Recognize that citizens, through legal political activities, can influence economic decisions made by government
13.	(a)(4)(A)	Locate and gather information
14.	(a)(4)(B)	Observe for detail
15.	(a)(4)(C)	Translate information from one medium to another
16.	(a)(4)(D)	Organize and express ideas in written form
17.	(a)(4)(E)	Distinguish fact from opinion
18.	(a)(4)(F)	Analyze information
19.	(a)(4)(G)	Draw conclusions
20.	(a)(4)(H)	Synthesize information
21.	(a)(4)(J)	Use problem-solving skills

Social Studies: 75.68

1.	(b)(3)(D)	Explain the development and importance of new business and labor organizations
2.	(i)(3)(A)	Analyze the development of self concept
3.	(i)(3)(C)	Establish individual long- and short-range goals
4.	(k)(2)(D)	Undertake personal leadership in groups
5.	(k)(2)(E)	Accept leadership of others

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
I-1-LP	(a)(1)(A) (a)(5)(C)	(b)(2)(A) (n)(2)(B) (p)(1)(E) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 13
I-1-LP-1	(a)(1)(A) (a)(1)(C) (a)(3)(C) (a)(5)(C)	(b)(4)(B) (b)(5)(A) (c)(5)(A) (f)(1)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J) (i)(3)(A) (k)(2)(D) (k)(2)(E)	LAR; obj. 1, 5 LAW; obj. 3, 7 Math; obj. 1, 3, 13
I-1-LP-2	(a)(1)(A) (a)(1)(C) (a)(3)(B) (a)(3)(C) (a)(5)(C)	(b)(4)(A) (c)(5)(A) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(B) (a)(4)(J) (a)(4)(C) (a)(4)(D) (a)(4)(F)	LAR; obj. 1, 3, 4 LAR; obj. 3, 7 Math; obj. 1, 5, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
I-1-LP-3	(a)(1)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C)	(b)(4)(A) (c)(5)(A) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(J)	LAR; obj. 1, 3, 4 LAW; obj. 3, 7 Math; obj. 1, 13
I-1-LP-4	N/A	(c)(10)(A) (p)(1)(E) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(J)	LAR; obj. 1, 2, 3, 4 LAW; obj. 6 Math; obj. 1, 5, 11, 13
I-1-LP-5	(a)(1)(A) (a)(1)(B) (a)(3)(B) (a)(4)(C) (d)(1)(A)	(b)(4)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(2)(E) (p)(4)(D)	(b)(4)(A) (c)(4)(C) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 4, 5 LAW; obj. 3, 6, 7 Math; obj. 1, 5, 11, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
I-1-LP-6	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(C) (a)(5)(C)	(b)(5)(A) (n)(2)(B) (n)(4)(B) (p)(1)(E) (p)(4)(D)	(a)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 4, 5 LAW; obj. 1, 6, 7 Math; obj. 3, 4, 11, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-1-LP	N/A	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 13
II-2-LP	(a)(1)(A) (a)(3)(C) (c)(4)(C)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 2 Math; obj. 1, 3, 4, 13
II-2-LP-1	(a)(1)(A) (b)(1)(A) (a)(3)(C) (c)(4)(C)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(4)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 2, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-2-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 2, 13
II-2-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 2, 4, 13
II-3-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 13

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-3-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 2, 13
II-3-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 2, 13
II-3-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 2, 3, 7 Math; obj. 1, 2, 4, 13

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-3-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 2, 4, 13
II-3-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 2, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-4-LP	(a)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-5-LP	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 2, 4, 13
II-5-LP-1	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 2, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-5-LP-2	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-5-LP-3	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-5-LP-4	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-5-LP-5	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(4)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-5-LP-6	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-6-LP	(a)(1)(A) (a)(1)(B) (a)(3)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(a)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-6-LP-1	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-6-LP-2	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-7-LP	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(a)(5)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-7-LP-1	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(c)(5)(A)	(a)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-7-LP-2	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(c)(5)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-7-LP-3	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(c)(5)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-7-LP-4	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(c)(5)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(H) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-8-LP	(a)(1)(A) (a)(1)(B)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-9-LP	(a)(1)(A) (a)(1)(B) (a)(4)(C)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-9-LP-1	(a)(1)(A) (a)(1)(B) (a)(4)(C)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-9-LP-2	(a)(1)(A) (a)(1)(B) (C)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (b)(4)(F) (d)(4)(G) (e)(4)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-10-LP	(a)(1)(A) (a)(3)(C) (a)(5)(C) (a)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(4)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-10-LP-1	(a)(1)(A) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(4)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-10-LP-2	(a)(1)(A) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13
II-10-LP-3	(a)(1)(A) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(4)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 1, 4, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-1-LP	(a)(1)(A) (a)(3)(B)	(b)(5)(A) (c)(7)(C) (d)(2)(C) (d)(9)(B) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J) (k)(2)(D)	LAR; obj. 7 LAW; obj. 1, 4, 5
III-2-LP	(a)(1)(A) (a)(1)(B) (a)(3)(B) (a)(5)(C) (a)(5)(G)	(b)(2)(A) (b)(4)(B) (d)(2)(C)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J) (k)(2)(D)	LAR; obj. 1, 3 LAW; obj. 1, 2, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 3, 4 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 3, 4, 6, 7, 8, 9, 12, 13
III-2-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-8	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-9	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-10	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-11	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-12	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-13	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-14	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-15	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-16	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-17	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-18	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-19	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-20	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-21	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-22	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-23	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-24	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (d)(4)(D) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (h)(7)(B) (n)(2)(B) (n)(4)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(1)(A) (a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1,2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

HOW TO USE THE CURRICULUM GUIDE

FOR

GENERAL MECHANICAL REPAIR 2

General Mechanical Repair 2 is the two-hour, one year (350 hour, 2 credits) instructional program with suggested activities for an additional 175 hours of enhanced activities for the three unit (525-hour/one-year) program.

Organizational Design

Materials in this guide may be used in either of two ways.

It may be used to help instructors prepare their lesson plans. In this instance, the student's reference text could serve as the text. Other useful information for instructors is the instructional delivery outline, the list of essential elements common to all trade and industrial courses and the unit and topic objectives.

Or, Curriculum Guide, Lesson Plans, Student Manual, and Competency Test Packets may be purchased from:

Educational Development and Training Center
East Texas State University
E. T. Station
Commerce, Texas 75429
(903) 886-5624
1-800-356-EDTC

This course addresses the common essential elements for Trade and Industrial Education. While the primary purpose of this guide is to assist the teacher in the course, it may be used in other ways.

Pages 5 through 8 of this guide list essential elements common to all trade and industrial courses.

An instructional delivery outline (teaching sequence) for the course is contained on pages 9 through 15. The instructional delivery outline contains the various sections, units, and topics of instruction; listing the essential elements covered in each topic; identification of instructional materials; and recommended hours of instruction for each unit of instruction.

The next section of the guide, pages 17 through 24, provides the objectives of each unit and the specific objectives to be met upon completion of each topic. These should be particularly useful to teachers who plan to prepare their own lessons.

Page 25 of this guide lists the resources developed for this course. These materials may be used in teaching the topics of instruction. If the suggested curriculum materials listed are used, the essential element requirements will be met.

The Appendix of this guide contains information covering Modification Techniques for Special Populations.

Instructional Materials

This course is divided into four basic sections of instructional materials. The first section covers the common essential elements for trade and industrial education. It is recommended that safety be covered prior to progressing into the specific course content. The remainder of the common essential elements may be introduced into the teaching sequence at the discretion of the instructor.

The remaining sections of materials may be taught in any order. These sections are:

Minor Automotive Maintenance
Small Engine Repair
Welding

Lesson Plans

The lesson plans are intended to assist instructors and administrators of the General Mechanical Repair program. Each lesson plan provides a listing of essential elements addressed; objectives; identification of type of lesson (cognitive or psychomotor); tools or equipment; materials; teaching aids; and references needed. Additional recommendations are made for teacher activities, student activities, evaluation/ verification, summary/closure, and reminder of upcoming lesson topics.

Included with the lesson plans are: Answers to Assignment Sheets for General Mechanical Repair and Answers to Competency Tests for General Mechanical Repair. These are located in Appendix A and B.

Student Materials Manual

The student materials manual includes information sheets, assignment sheets, and job sheets. The assignment sheets help the students master the technical information, while the job sheets provide applications of technical information with hands-on activities. Answers to assignment sheets are provided in Appendix A of General Mechanical Repair - Lesson Plans.

Competency Test Package

The competency tests have been designed to serve two purposes. They may be used as pretests to access the students' current level of knowledge or as competency tests to ascertain the students' level of mastery of the subject. Answers to competency tests are provided in Appendix B of General Mechanical Repair - Lesson Plans.

GENERAL MECHANICAL REPAIR 2

I. Common Essential Elements

II. Minor Automotive Repair - 20 Hours

Brake System

III. Small Engine Repair - 175 Hours

Outboard Engine
- Safety
- Carburetion
- Troubleshooting, Tune-Ups, Basic Repair

Motorcycle Engine
- Safety
- Basic Tune-Up
- Basic Repair
- Metric Measurement

Chain Saw
- Safety
- Fuel System
- Ignition System

IV. Welding - 110 hours

Safety
Equipment and Procedures

75.88 Trade and Industrial Education

(a) The elements in this subsection are common to all trade and industrial courses unless otherwise indicated and shall be included in each course at the appropriate level. They are described here to preclude repetitions in each course. Every school offering trade and industrial education shall provide courses which include the following essential elements:

(1) Leadership concepts and skills. The student shall be provided opportunities to:

(A) demonstrate skills, characteristics, and responsibilities of leaders and effective group members;

(B) demonstrate a knowledge of parliamentary procedure principles;

(C) plan and conduct leadership activities; and

(D) prepare for effective citizenship and for participation in our democratic society.

(2) Concepts and skills related to successful employment and/or postsecondary training. The student shall be provided opportunities to:

(A) identify employment opportunities and preparation requirements in chosen fields;

(B) identify effective methods to secure and terminate employment;

(C) demonstrate effective communication skills both oral and written and follow through on assigned tasks;

(D) demonstrate dependability and punctuality;

(E) demonstrate productive work habits and attitudes;

(F) understand the importance of taking pride in the quality of work performed;

(G) recognize the dignity in work;

(H) develop skills in planning and organizing work;

(I) apply required methods and sequences when performing tasks;

(J) apply principles of time management and work simplification when performing assigned tasks;

(K) identify ethical practices and responsibilities; and

(L) understand the importance of the application of organizational policies and procedures.

(3) Concepts and skills associated with entrepreneurship. The student shall be provided opportunities to:

(A) identify opportunities for business ownership;

(B) understand the risk and profit motive factor;

(C) understand the elements and advantages of the free enterprise system; and

(D) explain the role of small business in the free enterprise system.

(4) Concepts and skills related to safety and safe working conditions. The student shall be provided opportunities to identify and apply safe working practices to all training situations.

(5) Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:

(A) understand the importance of maintaining good health and proper appearance for effective job performance;

(B) understand oneself and others;

(C) exercise self-control;

(D) accept and use criticism;

(E) recognize basic human relationships as they relate to business success; and

(F) demonstrate characteristics for successful working relationships.

(6) Concepts and skills related to personal and business management. The student shall be provided opportunities to:

(A) explain how management assists in reaching personal and family goals;

(B) explain the management process;

(C) describe the role of management in controlling stress;

(D) identify and understand personal checking accounts;

(E) identify and understand personal loan application processes;

(F) identify and understand different financial institutions;

(G) identify the role and function of business management:

(H) understand the lines of authority; and

(I) identify effective supervisory techniques.

(7) Concepts and skills associated with the specific occupation being taught. The student shall be provided opportunities to:

(A) understand the basic concepts of and develop proficiency in the occupational area for which instruction/training is provided;

(B) develop a fundamental understanding of mathematical principles and scientific procedures;

(C) understand terminology utilized;

(D) identify tools, equipment, and materials used; and

(E) develop and demonstrate appropriate techniques for the selection, use, maintenance, and storage of tools, equipment, and materials.

(ddd) Coordinated vocational-academic education (CVAE)—general mechanical repair (2-3 units) shall include the essential trade and industrial education elements and the following essential elements:

(1) Concepts and skills associated with automobile mechanics. The student shall be provided opportunities to:

(A) understand the functions of the major automobile components;

(B) perform basic preventive maintenance functions on the automobile;

(C) demonstrate proper techniques in performing a tune-up on an automobile; and

(D) remove, repair, and replace automobile brake system components.

(2) Concepts and skills associated with small engine repair. The student shall be provided opportunities to:

(A) understand the functions of the small gasoline engine and its components;

(B) identify types of small gasoline engines;

(C) understand the proper fuel and fuel mixtures required for various types of small engines;

(D) service and repair small engine fuel systems, lubrication systems, and starting systems; and

(E) troubleshoot and repair small engines.

(3) Concepts and skills associated with welding. The student shall be provided opportunities to:

(A) understand the basic theory of oxyfuel welding, brazing, and cutting;

(B) utilize the oxyfuel cutting process to produce freehand cuts;

(C) weld and braze metal plate using the oxyfuel process;

(D) understand the basic theory of shielded metal arc welding; and

(E) utilize the shielded metal arc process to weld butt and tee joints on metal plate.

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Minor Automotive Repair			
Hydraulic Brake Service	(a)(4) (a)(7)(A) (a)(7)(E) (ddd)(1)(A) (ddd)(1)(B) (ddd)(1)(D)	I-1-IS	20
Total Hours of Basic Instruction			20

INSTRUCTIONAL DELIVERY OUTLINE
(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Small Engine Repair Outboard Engine			
Introduction and Safety	(a)(4) (a)(2)(C) (a)(7)(C) (a)(7)(D) (a)(7)(E)	II-1-IS	6
Carburetion	(a)(4) (a)(2)(C) (a)(7)(C) (a)(7)(D) (a)(7)(E) (iii)(1) (iii)(3) (iii)(4)	II-2-IS	20
Troubleshooting, Tune-ups, and Basic Repair	(a)(4) (a)(2)(C) (a)(7)(C) (a)(7)(D) (a)(7)(E) (iii)(1) (iii)(3) (iii)(4)	II-3-IS	20
Total Hours of Basic Instruction			46

INSTRUCTIONAL DELIVERY OUTLINE
(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Small Engine Repair Motorcycle Engine			
Safety	(a) (4) (a) (2) (C) (a) (7) (C) (a) (7) (D) (a) (7) (E) (iii)(3) (iii)(4) (ddd)(2)(A) (ddd)(2)(B) (ddd)(2)(C) (ddd)(2)(D) (ddd)(2)(E)	II-1-IS	8
Basic Tune-up	(a) (4) (a) (2) (C) (a) (7) (C) (a) (7) (D) (a) (7) (E) (iii)(1) (iii)(3) (iii)(4) (iii)(5) (iii)(6) (ddd)(2)(A) (ddd)(2)(B) (ddd)(2)(C) (ddd)(2)(D) (ddd)(2)(E)	II-2-IS	30

INSTRUCTIONAL DELIVERY OUTLINE
(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Small Engine Repair Motorcycle Engine			
Basic Repair	(a) (4) (a) (2) (C) (a) (7) (C) (a) (7) (D) (a) (7) (E) (iii)(1) (iii)(3) (iii)(4) (iii)(5) (iii)(6) (ddd)(2)(A) (ddd)(2)(B) (ddd)(2)(C) (ddd)(2)(D) (ddd)(2)(E)	II-3-IS	30
Metric Measurement	(a) (4) (a) (2) (A) (a) (2) (B) (a) (7) (C) (a) (7) (D) (a) (7) (E) (ddd)(2)(A) (ddd)(2)(B) (ddd)(2)(C) (ddd)(2)(D) (ddd)(2)(E)	II-4-IS	15
Total Hours of Basic Instruction			83

INSTRUCTIONAL DELIVERY OUTLINE
(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Small Engine Repair Chain Saw			
Safety	(a) (4) (a) (2) (C) (a) (7) (C) (a) (7) (D) (a) (7) (E) (iii)(3) (iii)(4) (iii)(6)	II-8-IS	6
Fuel System	(a) (4) (a) (2) (C) (a) (7) (C) (a) (7) (D) (a) (7) (E) (iii)(3) (iii)(4) (iii)(6)	II-9-IS	20
Ignition System	(a) (4) (a) (2) (C) (a) (7) (C) (a) (7) (D) (a) (7) (E) (iii)(1) (iii)(4) (iii)(6)	II-10-IS	20
Total Hours of Basic Instruction			46

INSTRUCTIONAL DELIVERY OUTLINE
(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Welding			
Safety	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (D) (ddd) (3) (A) (ddd) (3) (D) (ddd) (3) (E)	III-1-IS	10
Equipment and Procedures	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (D) (ddd) (3) (A) (ddd) (3) (D) (ddd) (3) (E)	III-2-IS	100
Total Hours of Basic Instruction			110

OBJECTIVES

Section I: Minor Automotive Repair

Unit 1: Brake System

Unit Objective: After completing this unit, the student(s) will be able to discuss service and replacement of components of drum, disc brakes, and rotor runout.

Specific Objective(s):

After completing this lesson, the student(s) will be able to service, remove, and replace components of the braking system.

After completing this lesson, the student(s) will be able to bleed the hydraulic system correctly.

After completing this lesson, the student(s) will be able to recondition a dual-piston master cylinder correctly.

After completing this lesson, the student(s) will be able to resurface a disc brake rotor correctly.

After completing this lesson, the student(s) will be able to remove and replace drum-type brake shoes correctly.

After completing this lesson, the student(s) will be able to resurface the brake drum correctly.

After completing this lesson, the student(s) will be able to adjust and service rear wheel parking brake correctly.

Section II Small Engine Repair

Unit 1: Outboard Engine

Unit Objective: After completing this unit, the student(s) will be able to identify the systems and parts of an outboard engine, perform regular maintenance checks, and recognize and repair engine problems in accordance with specified procedures and safety measures.

Specific Objective(s): After completing this lesson, the student(s) will be able to recognize hazards when using hand and power tools, cleaning engine parts, and operating engines and take appropriate safety precautions.

Unit 2: Outboard Engine

Unit Objective: After completing this unit, the student(s) will be able to identify the systems and parts of an outboard engine, perform regular maintenance checks, and recognize and repair engine problems in accordance with specified procedures and safety measures.

Specific Objective(s): After completing this lesson, the student(s) will understand terms used for carburetion, identify carburetor parts, and discuss symptoms of poor carburetion using appropriate terms.

After completing this lesson, the student(s) will be able to remove, disassemble, service, reassemble, and reinstall the carburetor of an outboard motor according to specified procedures.

After completing this lesson, the student(s) will be able to remove and reinstall carburetor for 9.5 hp omc outboard engine correctly.

After completing this lesson, the student(s) will be able to disassemble and reassemble a model B carburetor for 9.5 hp outboard engine according to specified procedures.

Unit 3: Outboard Engine

Unit Objective: After completing this unit, the student(s) will be able to identify the various systems and parts of the outboard engine, perform regular maintenance checks, and recognize and repair engine problems in accordance with specified procedures and safety measures.

Specific Objective(s): After completing this lesson, the student(s) will be able to identify steps to follow in troubleshooting and performing tune-ups and basic repairs for outboard engines.

After completing this lesson, the students(s) will be able to follow specified procedures to complete a compression check.

After completing this lesson, the student(s) will be able to follow specified procedures to remove and replace the spark plug(s) on an outboard engine.

After completing this unit, the student(s) will be able to follow specified procedures to remove the flywheel on outboard engines.

After completing this unit, the student(s) will be able to follow specified procedures to remove and reinstall the breaker point distributor.

After completing this unit, the student(s) will be able to follow specified procedures to remove and reinstall the powerhead.

Unit 4: Motorcycle Engine

Unit Objective: After completing this unit, the student(s) will be able to identify the benefits of working safely; use tools, equipment, and chemicals correctly; and perform basic tune-ups and repairs according to specified procedures.

Specific Objective(s): After completing this information sheet, the student(s) will be able to demonstrate an understanding of good housekeeping and proper use of solvents and chemicals.

Unit 5: Motorcycle Engine

Unit Objective: After completing this unit, the student(s) will be able to discuss special tools, equipment, and procedures for a basic tune-up and demonstrate an ability to perform those procedures

Specific Objective(s): After completing this information sheet, the student(s) will be able to discuss the sequence and identify the tools and equipment needed for an engine tune-up.

After completing this lesson, the student(s) will be able to follow specified procedures to perform a compression test on a motorcycle engine.

After completing this lesson, the student(s) will be able to adjust the cam chain tension according to specifications.

After completing this lesson, the student(s) will be able to inspect the ignition timing following specifications.

After completing this lesson, the student(s) will be able to synchronize carburetors on a multi-cylinder engine according to specifications.

After completing this lesson, the student(s) will be able to change engine oil and filter on motorcycle engines according to specifications.

After completing this lesson, the student(s) will be able to service the air filter correctly.

Unit 6: Motorcycle Engine

Unit objective: After completing this unit, the student(s) will be able to discuss procedures to perform engine service on two-stroke and four-stroke engines, and identify components, disassemble, clean, inspect, and reassemble the engine correctly.

Specific Objective(s): After completing this information sheet, the student(s) will be able to discuss procedures to perform engine service on two-stroke and four-stroke engines.

After completing this lesson, the student(s) will be able to disassemble, inspect, and reassemble a four-stroke motorcycle engine.

After completing this lesson, the student(s) will be able to disassemble, inspect, and reassemble the two-stroke motorcycle engine correctly.

Unit 7: Motorcycle Engine

Unit Objective: After completing this unit, the student(s) will understand the need for metric measurement in motorcycle and ATV work and identify metric measuring tools, conversion tables, and metric prefixes.

Specific Objective(s): After completing this information sheet, the student(s) will be able to measure selected work pieces with a vernier caliper, metric micrometer, telescoping gauge, small bore gauge, and the dial indicator.

After completing this lesson, the student(s) will be able to use a vernier caliper correctly.

After completing this lesson, the student(s) will be able to measure workpieces using the metric micrometer correctly.

After completing this lesson, the student(s) will be able to use a dial indicator correctly.

After completing this lesson, the student(s) will be able to use a telescoping gauge correctly.

Unit 8: Chain Saw Engine

Unit Objective: After completing this unit, the student(s) will be able to identify hazards, safety procedures, and operator protective equipment connected with chain saw use.

Specific Objective(s): After completing this information sheet, the student(s) will be able to identify parts of a chain saw and safety practices to be followed when using a chain saw

Unit 9: Chain Saw Engine

Unit Objective: After completing this unit, the student(s) will be able to mix fuel ratios and service and adjust the carburetor and fuel delivery system correctly.

Specific Objective(s): After completing this information sheet, the student(s) will be able to name and identify parts of a chain saw fuel system and troubleshoot common carburetor problems.

After completing this lesson, the student(s) will be able to adjust the carburetor on a chain saw according to specified procedures.

After completing this lesson, the student(s) will be able to service a chain saw carburetor according to specified procedures.

Unit 10: Chain Saw Engine

Unit Objective: After completing this unit, the student(s) will be able to replace points and condenser and remove, replace, and adjust the solid state ignition module.

Specific Objective(s): After completing this information sheet, the student(s) will be able to work on and remove, replace, and service the ignition system and parts according to specified procedures.

After completing this lesson, the student(s) will be able to remove, replace, and adjust the solid state ignition module.

After completing this lesson, the student(s) will be able to remove breaker points from electric start and manual start chain saw ignition systems.

After completing this lesson, the student(s) will be able to install breaker points on electric start and manual start models.

Section III Welding

Unit 1: Gas Tungsten Arc Welding (GTAW)

Unit Objective: After completing this unit, the student(s) will be able to identify and use a gas tungsten arc welding machine and equipment, types of welds, positions used in welding, and proper safety.

Specific Objective(s): After completing this information sheet, the student(s) will be able to recognize hazards in the use of the gas tungsten arc welding machine and making welds and understand and use the terminology.

Unit 2: Gas Tungsten Arc Welding (GTAW)

Unit Objective: After completing this unit, the student(s) will be able to use the terms associated with, identify the steps in, and identify the advantages of GTAW.

Specific Objective(s): After completing this information sheet, the student(s) will be able to select the correct electrode, filler rod, cup, and collet size, and set up, adjust, and operate the GTAW/TIG welder.

After completing this lesson, the student(s) will be able to set up the flow meter regulator for the GTAW shielding gases.

After completing this lesson, the student(s) will be able to lay stringer beads.

After completing this lesson, the student(s) will be able to lay a butt weld in the flat position.

After completing this lesson, the student(s) will be able to prepare the tungsten electrode for welding mild or stainless steel correctly.

After completing this lesson, the student(s) will be able to set up and shut down the GTAW equipment for welding mild and stainless steel.

After completing this lesson, the student(s) will be able to prepare mild and stainless steel for GTAW.

After completing this lesson, the student(s) will be able to strike and maintain an arc to make stringer beads on mild or stainless steel without filler metal in the flat position.

After completing this lesson, the student(s) will be able to strike and maintain an arc to make stringer beads on mild or stainless steel with filler metal in the flat position.

After completing this lesson, the student(s) will be able to weld an open-root square-groove butt joint on mild or stainless steel in the flat position.

After completing this lesson, the student(s) will be able to weld an open-root corner joint on mild or stainless steel in the flat position.

After completing this lesson, the student(s) will be able to weld an open-root square-groove butt joint on mild or stainless steel in the vertical position.

After completing this lesson, the student(s) will be able to weld an open-root corner joint on mild or stainless steel in the vertical position.

After completing this lesson, the student(s) will be able to prepare nonferrous metal for GTAW.

After completing this lesson, the student(s) will be able to prepare a tungsten electrode for welding nonferrous metals.

After completing this lesson, the student(s) will be able to strike and maintain an arc to make stringer beads on nonferrous metal without filler metal in the flat position.

After completing this lesson, the student(s) will be able to weld a fillet weld lap joint on aluminum in the flat position.

After completing this lesson, the student(s) will be able to weld a fillet weld tee joint on aluminum in the flat position.

After completing this lesson, the student(s) will be able to weld a square groove butt joint on aluminum in the flat position.

After completing this lesson, the student(s) will be able to weld an open-root corner joint on aluminum in the horizontal position.

After completing this lesson, the student(s) will be able to weld a fillet weld lap joint on aluminum in the vertical position.

After completing this lesson, the student(s) will be able to weld a fillet weld lap joint on aluminum in the overhead position.

After completing this lesson, the student(s) will be able to weld a fillet weld tee joint on aluminum in the overhead position.

After completing this lesson, the student(s) will be able to weld a square-groove butt joint on aluminum in the overhead position.

After completing this lesson, the student(s) will be able to weld an open-root corner joint on aluminum in the overhead position.

RESOURCES DEVELOPED FOR GENERAL MECHANICAL REPAIR 2

General Mechanical Repair 2 Curriculum Guide, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-126-CG.

General Mechanical Repair 2 Student Materials Manual, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-126-SM.

General Mechanical Repair 2 Competency Test Packet, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-126-CTP.

General Mechanical Repair 2 Lesson Plans, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-126-LP.

APPENDIX

MODIFICATION TECHNIQUES FOR SPECIAL POPULATIONS

Acknowledgement

The module 7 Overview of the *Vocational Special Needs Teacher Training Curriculum* has been reprinted with permission as this appendix. Teachers are encouraged to refer to the original publication to learn more about working with special needs populations. The character font size and line spacing have been changed in this appendix to save space.

The project was developed in 1987 by Craig R. Colby, Ed.D. of Texas A&M University. Linda H. Parrish, Ph.D., Texas A&M University, and Jerry L. Wircenski, Ph.D., North Texas State University, were the project directors.

The vocational special needs teacher training curriculum was developed pursuant to a contract with the Texas Education Agency's Vocational Education Special Projects. Contractors or grantees undertaking such projects under Agency sponsorship are encouraged to freely express their professional judgment in the conduct of the project. Opinions stated do not, therefore, necessarily present official Texas Education Agency position or policy.

This information is presented as an appendix to help Trade and Industrial teachers with planning the modification of instruction for special populations. Many of the concepts and ideas presented are sound practices to be used with normal populations.

The entire 10 module training curriculum is available through the University of Texas at Austin. The modules in the vocational special needs teacher training curriculum are as follows:

Module 1	How to Use the Modules
Module 2	Federal Legislation
Module 3	Learner Characteristics
Module 4	Vocational Assessment
Module 5	Coordinated Planning
Module 6	Interagency Cooperation
Module 7	Modifications
Module 8	Generalizable Skills
Module 9	Serving LEP Students
Module 10	Student Evaluations

Curriculum Modification

The term "vocational curriculum" can be defined as the organized content of a particular discipline which a student must master to attain an occupational goal. It involves the sum total of all experiences and learning activities encountered in the classroom. A curriculum is concerned with results. It encompasses "what is to be taught" and "what is to be learned" (Stern-Otazo, 1980; Goh & Sitlington, 1983).

As discussed in previous modules, each student has a mental capacity, physical skills, and various needs which vary from one individual to the other. In addition, students exhibit different learning styles. All good teachers recognize this and will work toward developing a classroom environment which is characterized by a deep respect for the learner, acceptance of student, fulfillment of individual needs, and individual development. This is what is meant by the teacher who has become "learner-centered" and not "content-centered" (Pine & Boy, 1977). Jones (1977) eloquently describes recognizing individual worth and individual development as being the basis for curriculum development as follows:

> **Individual development** as a basis for curriculum perspective would lead us to teach discovery of principles and sacredness of the individual personality. It would teach the learners to view themselves as self-actualizing individuals in a setting designed to support and encourage personal development to the ultimate of one's potential. Attempts to improve the local community would center around providing a richer and fuller life for personal growth and development. Good people make good communities, good states, good nations, and good world. By emphasizing development of individuals, such a curriculum would hope to plant the seed for a better world in the future.

Therefore, all learners should be perceived as very "special" individuals who one day will take their place in society. It is the responsibility of educators to assist **all** learners (in spite of their shortcomings) to become productive members of society. This can be accomplished by helping each student establish attainable career goals and then providing meaningful experiences through which the student can achieve these goals. Every student should be treated with dignity, as an individual who has unique strengths and interests in life. It is not necessary or even realistic to expect every student to do and know all the same things. As stated by Jones (1977), "Learners should become worthwhile persons in their own right,...it is not necessary that they all become miniature images of the same pattern."

Purpose of Curriculum Modification

When working with students with special needs, a learner's curriculum may need to be modified or adjusted to take into account major differences which could be found among these individuals. The term "curriculum modification" can be defined as tailoring an existing curriculum to the unique needs of students as they pursue an occupational goal (Sarkees & Scott, 1985; Goh & Sitlington, 1983). However, it should be strongly emphasized that modifying a curriculum does not mean that an educator should lower or alter the standards of his or her program. What it does mean is that the Admission Review and Dismissal (ARD) Committee (for handicapped students) or coordinated planning team (for disadvantaged and LEP students) determines which essential elements in the regular school curriculum would be appropriate

for a student's needs. The State Board Of Education Rules For Curriculum offers the following key points (Texas Education Agency, 1985):

1. For students with special needs, school districts shall provide modifications in methodologies, pacing, and materials to ensure that instruction is delivered, as appropriate, in the essential elements.

2. Students with special needs shall be instructed in those same essential elements in a manner appropriate to their needs.

3. School districts shall implement the provisions (under Chapter 75) in a manner which will enable all students to participate actively in a well-balanced curriculum and master, to the best of their abilities, the knowledge, skills, and competencies established through the essential elements.

4. Specialized personnel and regular program personnel shall be jointly responsible for the cooperative delivery of effective instruction in the essential elements, as appropriate.

It is important to re-emphasize that special needs students, as all students, have capabilities which widely vary. The challenge parents, educators, and vocational counselors face is to help each learner reach occupational goals which are within the student's potential.

The Curriculum Modification Process

In developing a meaningful and challenging vocational curriculum, for a special needs learner, the ARD Committee or coordinated planning team should carefully review the student's vocational assessment information which consists of: (a) the student's capabilities, (b) parent and student interviews (including the career expectations of the learner), (c) the student's vocational interests and abilities, and (d) the teacher's informal behavioral assessments of the student.

After reviewing this information, the planning team can then work toward developing realistic and appropriate vocational goals for the student. Important items to consider when developing vocational goals include: (a) community employment needs, (b) vocational readiness skills, (c) multiple exit points (jobs that a learner can prepare for in the vocational program), and (d) entry-level competencies expected by employers for each of the exit points. In this way, the learner would be aware of realistic employment opportunities, specific skills needed for entry into a vocational program, and specific objectives which must be fulfilled in reaching an employment goal.

A number of special education curriculum models have been designed which take into account both the needs of a vocational program and the needs of the learner. The basic components which many of the designs have in common are as follows:

1. The importance of working with existing vocational curricula.

2. The importance of building upon the student's interests and competencies.

3. The identification of long range vocational goals and short range objectives—which are stated in measurable terms.

For the purpose of this overview, the competency-based curriculum modification model has been selected for discussion.

The Competency-Based Curriculum

Over the years, the concept of competency-based curriculum has increased in popularity largely due to the emphasis on accountability in education (Choate, et al., 1987). In addition, since the passage of P.L. 94-142, vocational educators have had to adjust their curricula to take into account the capabilities of special needs learners.

The underlaying principle behind the competency-based curriculum is to assist the student in becoming a more effective person. This entails helping the student develop skills or competencies which will promote employment opportunities and a higher self-esteem within the student (Brolin, 1976; Lippmann & Porter, 1976). The ability to succeed is what makes competency-based learning so valuable for students with special needs (Kok, 1978). With competency-based learning a student does not have to wait until the end of the program to experience success. The sequential steps called for throughout the program afford the possibility of success on a day-to-day basis (Lippmann & Porter, 1976).

The concept of competency-based learning is relatively simple. Based upon the learner's assessment information, the educator establishes specific goals (competencies) which will help the student "function adequately as a consumer, a producer, a learner, and a citizen" (Parnell, 1973). For example, in an auto mechanics class, the student's occupational program goals or competencies may include one or more of the following: (a) performing a simple lubrication, (b) repairing a tire, (c) changing the battery, (d) completing an engine tune-up, (e) completing a valve job, (f) fixing the carburetor, or (g) overhauling the engine. Next, the educator develops objectives and an individualized instructional plan for the student to follow. This individualized instructional plan includes: (a) an objective, (b) an introduction, (c) a learning activity, (d) a test/checklist, and (e) answers/feedbacks.

Therefore, in competency-based learning it is not necessary or even realistic for the instructor to expose every learner to all the aspects of a vocational program. Competency-based learning focuses on the quality of learning rather than the quantity of learning such that the student who has limited skills could still find employment (Kok, 1978).

Gill's Four-Step Model

An excellent competency-based paradigm or model which can be utilized by vocational educators to maximize a learner's vocational potential was developed by Douglas H. Gill (Sarkees & Scott, 1982). The design of Gill's model involves the use of four sequential steps and utilizes the regular vocational curriculum as a basis for the modification process.

Step one. The first step in Gill's model requires the educator to gain a clear picture of the existing curriculum any student would follow in a particular vocational program. Gill calls this step "Establishing the Curriculum Framework." The purpose of this step is to organize the existing curriculum in such a way that it can be modified. This step involves: (a) identifying the overall long-range goals of the vocational program, (b) identifying and listing the short-term objectives that sequentially comprise each long-range goal, and (c) identifying the instructional units which comprise a sequence for attaining each short-term objective. An example of

a curriculum framework which outlines an overall long-range goal, short-term objective, and instructional units follows:

1. **Long range goal:** Given appropriate tools, equipment and materials, the student will be able to demonstrate instructor specified job entry level skills in the masonry area of construction trades at a comparable rate of time and accuracy to that found on the job.

2. **Short term objective:** The student will be able to demonstrate the basic skills of bricklaying.

3. **Instructional units:** Spreading mortar. Laying brick to a line. Building a brick corner. Cutting brick and block.

Once the long range goals, short term objectives, and instructional units have been outlined for a particular vocational program, the educator can begin the work of modification for a special needs learner.

Step two. Step two of Gill's four-step model, "Developing an Instructional Task Analysis," builds upon step one. The instructional task analysis lists the tasks that, when sequenced, make up the instructional unit. In this step the educator identifies the required tasks the student must perform, emphasizing what the student must do rather than what the student must read or write. An example of instructional tasks for one of the instructional units above follows:

1. **Instructional unit:** Spreading mortar.

2. **Instructional tasks:**
   Mix mortar.
   Identify and use trowel.
   Identify and use mortar board.
   Wet mortar board.
   Place mortar on board.
   Bunch mortar.
   Load trowel.
   Distribute mortar.
   Furrow mortar.
   Cut excess mortar.
   Seat mortar to trowel.
   Butter brick.
   Butter head joint.
   Lay one brick to another.
   Identify and explain purpose of running half-bond.

Therefore, establishing the curriculum framework and required instructional tasks (task analysis) organizes the instructional process and prepares for the next step in the process.

Step three. The third step in Gill's four-step model represents the implementation stage. This step, "Developing the Curriculum Supplement," involves developing usable supplements for the existing curriculum. The curriculum supplement is designed to be used jointly by

the instructor and the resource support person. The curriculum supplement is composed of two major parts: (a) the Learning Plan and (b) the Supplemental Learning Plan.

The Learning Plan is used primarily by the instructor and consists of the following four basic parts:

1. Instructional unit
2. Instructional task
3. Performance-based task activities
4. Performance-based task check

The instructional unit and instructional task are components of the curriculum framework. The performance-based task activities describe for the instructor those task elements the student will do. The performance-based task check is a measurement of the student's ability to master the task at hand.

The Supplemental Learning Plan was developed for use primarily by special needs support personnel and consists of the following six basic parts:

1. Instructional Unit
2. Instructional task
3. Task terminology
4. Essential math operations
5. Coordinated movements
6. Related concepts

The purpose of the Supplemental Learning Plan is to identify basic knowledge (task terminology, essential math operations, important concepts) and prerequisite skills (coordinated movements, related concepts) the learner must posses in order to complete an instructional task. The Supplemental Learning Plan can be very useful in helping the resource teacher and instructor identify those areas where instruction support may be needed. It is, therefore, very important that the Learning Plan and Supplemental Learning Plan be developed by the instructor, special education teacher, or support/resource teacher for each instructional task. In this way, if a learner has difficulty mastering a specific task, individualized activities can be developed by selected individuals to help the student resolve the problem.

Step four. The fourth and final step of Gill's model is the development of an individualized student module. The student's module is created from the Learning Plan and Supplemental Learning Plan and is the culmination of the curriculum modification process. The student's module consists of the following four components (Goh & Sitlington, 1983):

1. **Word section:** Includes terms identified on the supplemental learning plan, along with definitions of each term.

2. **Job tasks:** Definition of each step in the job. This appears in the student module under the heading "What You Do."

3. **Illustrations of job tasks:** The illustrations help clarify the job steps and should be clear and precise, without being complex.

4. **Evaluation procedures:** Both enroute (formative) checkups and a final (summative) performance check are included to assess the learner's progress through the module.

The student's module is tailored to help meet the specific needs of a learner and serves as a guide to assist the student in achieving instructional tasks. Various ways in which a student's module can be individualized to take into account the various learner differences found in the training setting are as follows (Goh & Sitlington, 1983):

1. The amount of detail and illustrations can be varied to take into account learner differences in intellectual abilities and educational backgrounds.

2. The mode of presentation can be altered to meet the needs of learners with differences in learning styles (e.g. audio-cassettes can be added for auditory learners).

3. The amount of feedback from the module and instructor can be increased or decreased to match differences in motivation, perseverance, and tolerance levels.

In summary, Gill's four-step model is a competency-based process flowing directly from the regular vocational curriculum. The steps range from establishing a curriculum framework to developing an individualized student module. Gill's model is not designed to replace or lower the standards of the regular vocational curriculum. It is a systematic process by which a special needs student can achieve solid vocational goals through the cooperative support of vocational instructors, special educators, and support personnel.

Responsibilities of the Vocational Educator

The primary responsibility of the vocational educator in the curriculum modification process is to help the special needs student establish and reach realistic occupational goals. In an effort to accomplish this, the vocational educator must identify the following (Sarkees & Scott, 1985):

1. Pertinent information about what will be taught in a vocational program.

2. Necessary requirements for program completion.

3. Multiple exit points (jobs that the learner can prepare for in a vocational program).

4. Entry level competencies expected by employers for each of the exit points.

It is also the responsibility of every vocational educator to establish an effective and wholesome learning environment for their students. Providing this environment may involve modifying

the vocational facility, equipment, tools and/or instruction. This information will be provided in the following section.

Modification of the Learning Environment

The term "learning environment" refers to both the physical and instructional setting of the vocational classroom/laboratory (Bell, 1984). It is the responsibility of each vocational educator to work at developing a learning environment which will contribute to the overall well-being and success of every student. The key factors found in wholesome learning environment are those which promote:

1. **Safety, organization, and physical comfort.** In the vocational laboratory, it is absolutely crucial that each student abide by safety rules set by the instructor. In addition, the laboratory should be kept well organized and clean. A laboratory which is safe, well organized, and physically comfortable helps promote high morale and good work habits.

2. **Respect and acceptance.** Within an effective learning environment, students will show respect not only for the instructor but for each other as well. The instructor should be the student's best role model. The care and acceptance given by the instructor to each student (disabled or non-disabled) will go a long way in promoting peer acceptance, a positive attitude, and healthy self-esteem.

3. **Discipline**. A wholesome learning environment is one which promotes discipline and a positive self-concept within each student. Inappropriate behavior has the potential to seriously affect classroom safety, morale, and the overall learning process. Ways in which the instructor can help the student modify inappropriate behavior include: (a) utilizing the time-out technique, (b) developing student-teacher contracts, (c) ignoring negative behavior—whenever possible, and (d) rewarding appropriate behavior with approval and praise.

4. **Flexibility**. An effective learning environment is flexible and can adapt to a special student's unique needs (i.e., slower rate of learning, inability to access regular tools/equipment, or remedial needs in reading or math for instance). A flexible environment fosters individualized programs through which a special learner can develop marketable skills for employment.

Modifying Facilities, Equipment, and Tools

In the past, many special needs learners have been denied their basic right to a public education because of architectural barriers, nonadaptive facilities, equipment, and tools (Phelps & Lutz, 1977). However, federal legislation has done a great deal to provide equal access to educational programs for every learner. For example, according to Section 503 of the Rehabilitation Act of 1973, each federally funded program or activity in which a handicapped individual can enroll and profit must be made accessible to the student (Sarkees & Scott, 1985). In addition, the Carl Perkins Act of 1984 has emphasized the importance of providing

supplemental services for special needs learners, which include the adaptation of facilities, equipment, curriculum, and instruction (Cobb & Kingbury, 1985).

Modifying facilities. A barrier-free facility planned for safety, efficiency, and convenience is of vital importance to individuals with special needs—especially those who are in wheelchairs, on crutches, or have artificial limbs. According to Sarkees & Scott (1985), three major areas in which architectural barriers may be present at most vocational education facilities are:

1. **Getting to and entering the building** — getting to the ground from public or private transportation; parking; negotiating parking lot pavement, curbs, walkways, ramps, and stairways; and entering exterior doors.

2. **Moving about inside a building** — moving through corridors and hallways; moving from floor to floor; identifying and entering classrooms, laboratories, and auxiliary areas; moving through aisles and traffic lanes inside classrooms and laboratories.

3. **Using school fixtures, appliances, and study/work station area equipment** — using restrooms, drinking fountains, vending machines, tools, machines, and work station apparatus.

In an effort to eliminate these barriers, vocational educators, planners, and administrators should contact the State Architectural Barriers Board or State Department of Education regarding the guidelines and standards that have been developed for compliance with federal mandates. The federal government has adopted the American National Standards Institute (ANSI) accessibility standards as its mandatory guidelines for removal of architectural barriers (Sarkees & Scott, 1985).

Modifying equipment and tools. Based upon the needs of each special learner, it may become necessary to modify existing equipment and tools to accommodate the special needs student. The degree of modification will depend upon the type and extent of each student's impairment. It should be remembered, however, that equipment should be modified only to the extent necessary to assist the student. Whenever possible, as the student generates competence in a learning task, the modified equipment should be replaced with regular equipment (Phelps & Lutz, 1977). The following are some general suggestions in which equipment and tools can be modified for specific classifications of special needs students (Phelps & Lutz, 1977; Sarkees & Scott, 1985; Stern & Gathercoal, 1986):

Important Note:	It is very possible that a number of these suggestions could apply to more than one category. Furthermore, some of these modifications may be applicable to disadvantaged and LEP students. This, of course, would depend upon the needs of the particular student.

Modifications for Orthopedically-Impaired Students

1. Work benches can be cut out so that wheelchair bound students can pull up close to the work surface.

2. Modify the height of workbenches, storage cabinets, table tops, etc. to make them accessible to wheelchair bound students.

3. A lap board can be fitted on the arms of the wheelchair to provide a work area.

4. Rearrange storage areas for tools and supplies to make them accessible and as near to the work station as possible.

5. Position bench-mounted power tools on the ends of benches.

6. Semistationary equipment should be put on variable height bases.

7. Modify machine controls so that they can be operated with prostheses such as an arm hook.

8. Replace cabinet knobs with levers or handles.

9. Convert knob-type ON-OFF switches to toggle switches, levers, or slide-adjustment mechanisms.

10. Provide an aid that increases mechanical advantage in manipulating controls.

11. Convert machines and equipment that have hand controls to the foot pedal type for students who have upper extremity disabilities.

12. Select machines that do not require two-handed operation, such as a radial arm saw instead of a table saw.

13. Place small parts of instruments on a foam pad to aid students in picking them up.

14. Select tools that require only one hand to operate, such as split screwdrivers, which hold screws and bolts for starting.

15. Provide holding devises such as vacuum vises, stationary vises, clamps, jibs, and fixtures that permit one-handed operation.

16. Provide tools that supply more mechanical advantage to loosen or tighten screws or bolts, such as a lever-type socket set or an offset screwdriver.

17. For students who have weak hands, increase the size of tool handles by replacing them with larger diameter handles or by enlarging them with tubing or tape wrappings.

18. Provide templates to aid drafting students who have trouble manipulating standard drafting instruments.

Modifications for Hearing-Impaired Students

1. Install a red light next to the on-off switch so that the student can tell when the machine is in operation.

2. Install amplification devices on auditory warning signals so that they can be heard by those with partial hearing.

3. Use visual timers in place of those that emit sounds.

Modifications for Visually-Impaired Students

1. Purchase commercially available measuring tools with raised or engraved markings that can be read by touch.
2. Purchase measuring devices that provide auditory signals.
3. Brailled tape or raised marks can be used on control dials and switches.
4. Enlarge markings on tools, tool holders, or machine controls.
5. Provide jigs, guides, and templates to aid students in positioning and guiding tools.
6. Identify controls by changing their size, shape, or texture.

Modifications for Mentally-Impaired Students.

1. Color code important parts of machines or equipment.
2. Devise jigs, fixtures, templates, and guides to simplify work task operations.

Modifications for Limited English Proficient Students

1. Utilize name placards (Spanish and English) for machines, tools, and equipment.
2. Color code or use symbols for dangerous machines. For example, one red dot could indicate a dangerous machine and two red dots could indicate a very dangerous machine.

A wide variety of specially designed aids, tools, machines, and equipment are commercially available to assist the special needs learner. Occasionally, this material can be paid for through vocational rehabilitation centers or the school's special education program. Information pertaining to manufactured devices can be found in school supply catalogs or in catalogs published by special institutes. A very comprehensive resource has been developed by the Wisconsin Studies Center, University of Wisconsin-Madison, entitled Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People. In addition, information is available through the school's special education personnel and vocational rehabilitation counselors (Sarkees & Scott, 1985).

In conclusion, two educational topics have been presented which are **fundamental components** to the successful instruction of learners with special needs: (a) developing or tailoring an appropriate curriculum and (b) establishing a favorable learning environment. Within the final section of this overview, basic principles will be presented which will address the actual instruction of special learners.

Modification of Instruction

The primary purpose of this section is to provide the vocational educator with teaching strategies and techniques that will be useful when instructing students with special needs. It is important to remember that the methods and approaches used by educators when instructing non-special needs students may not be very effective with students with special needs (Gleiss-Monar & Sitlington, 1983). Therefore, individualizing instruction becomes vitally important in the successful instruction of special learners.

Within this section, the following topics will be discussed: (a) learning styles, (b) teaching strategies, (c) remediation techniques, and (d) Brown's 3-Cs Instructional Mode.

Learning Styles

Each special learner has unique needs and these needs affect how the student can best learn. For example, if a student is blind or has difficulty with "visual" learning, the instructor should stress the learner's sense of sight. Therefore, the manner in which a student with special needs learns ceases to be a preference, but becomes instead a necessity (Kok, Jernigan, & Hull, 1978). Further, one of the main philosophies behind individual learning styles is that learning should be a pleasant and successful experience. Educators, therefore, should adjust their style of teaching to allow students the benefit of learning in their preferred manner (Kok, Jernigan, & Hull, 1978).

Identifying a student's learning style.

The following are methods in which an educator can identify a student's learning style:

1. **Informal observation**. One of the simplest and possibly best ways to identify a student's learning style is through informal observation. By observing the student as he or she negotiates classroom/laboratory learning activities, the educator can collect valuable information with regard to the student's learning style. For example, the educator may observe that a disadvantaged student answers questions in class and does well with hands-on activities but repeatedly fails written exams. If the primary intent of the instruction is to reach vocational skills rather than reading and writing skills, the instructor could modify their style of teaching by allowing the student to take oral and/or hands-on exams (Kok, Jernigan, & Hull, 1978: Sarkees & Scott, 1985).

2. **Teacher consultation**. Consulting other teachers (i.e., special education teachers, resource room teachers, support personnel, paraprofessionals, and other vocational education teachers) can be an excellent source for information regarding a student's learning style (Sarkees & Scott, 1985).

3. **Student/parent interviews**. Interviewing the student and student's parents/guardians can result in valuable insights as to the student's best learning modes (Sarkees & Scott, 1985)

4. **Standardized inventories**. Standardized inventories provide an alternative for students who are shy or uncomfortable during a personal interview. Information received from interest, personality, and learning style inventories can provide valuable information with regard to the student's learning style (Kok, Jernigan, & Hull, 1978; Sarkees & Scott, 1985).

Teaching Strategies

Once the student's vocational goals, learning capability, and preferred learning style have been identified, the educator can begin to experiment with a variety of teaching techniques and instructional materials. When determining the teaching technique and instructional material best suited to meet a student's unique needs, it is important for the educator to be patient, open-minded, and flexible. Not every instructional technique and/or material can be used successfully with each learner (Sarkees & Scott, 1985). In addition, the educator should not hesitate to enlist the support of other instructors, school counselors, student aides, paraprofessionals, volunteers from the community, itinerant teachers, and/or interpreters. This pooling of efforts can result in increased student learning because of the variety of approaches and personal attention which can be brought to the classroom or laboratory (Harrington & Fardig, 1982).

The following are general guidelines and instructional techniques which an educator can use to help meet a special needs learner's unique needs and learning style:

1. **Orientation**. Students with special needs may need additional orientation with regard to: (a) the relevancy of their individualized goals, (b) class procedures, (c) safety, etc.

2. **Flexible pacing**. Students with special needs can exhibit different rates of learning. The educator should provide flexibility in pacing of instruction and assignments to meet the various needs of learners. In general, students with special needs should be individually paced to maintain their progress and interest, yet avoid the frustrations and failure undue pressure may cause (Harrington & Fardig, 1982; Sarkees & Scott, 1985).

3. **Demonstration**. Utilization of the demonstration method can be very effective in introducing a new skill to a learner with special needs.

4. **Breaking material into small distinct steps**. As a general rule, it is important for the educator to break a learning concept into small distinct steps. In this way, the educator can best identify where the student is experiencing difficulty.

5. **Positive environment and feedback**. In general, students with special needs lack confidence and a positive self-concept. This is primarily due to their not having had much success in life. In addition, the few successes special learners do have usually result in little, if any, positive reinforcement (i.e., praise, reward, and/or encouragement). Therefore, it is incumbent upon educators to create a positive, nonthreatening learning environment for their students and to make generous use of positive feedback when the student experiences success. Constructive criticism should not be avoided; however, it should be given in a positive manner (i.e, students should

understand that their behavior or product is what's being criticized and not their worth as a human being). Finally, all students must learn that mistakes and constructive criticism are a normal and expected part of life (Harrington & Fardig, 1982).

6. **Use of peer tutors, college students, and volunteers**. Use of peer tutors, college students, and volunteers can greatly assist a vocational educator's work with special learners by: (a) helping with individualized instruction, (b) providing positive role models, (c) increasing student participation, (d) increasing the special learner's success experiences, (e) increasing the student's confidence and self-esteem, and (f) improving the special learner's social and academic skills (Asselin & Anderson, 1986). In addition, peer tutors, college students, and volunteers can receive teaching experience and the satisfaction of helping individuals with special needs progress.

7. **Flexible grouping**. The educator can integrate special needs learners into groups of various sizes (according to the student's goals, interests, or ability level) and utilize peer tutors, college students, and volunteers for assistance. According to Sarkees & Scott, grouping students has the following advantages: (a) it allows the teacher more time to work among the students, (b) it allows the teacher to individualize instruction, tasks, and assignments to meet the needs of students in a specific group, (c) it provides special needs learners with an opportunity to work with peers and establish positive interpersonal and working relationships with them, (d) it serves as a motivating factor for special needs learners because the individualized nature of the group work does not become threatening or frustrating but allows students an opportunity to work at their own pace through their strongest learning style, (e) it allows teachers to arrange for instruction for the entire class, small group discussions, project groups, and small remedial sessions so that instruction will be diversified and more meaningful for all students; and (f) it allows the teacher to modify the task or assignment for a small group of students with specific needs, as in the case of learners who have a physical disability (Sarkees & Scott, 1985).

8. **Providing field trips and job site visits**. Scheduled field trips and job site visits can give all learners a realistic first-hand look into the real world of work. By "shadowing" workers in a particular occupational area, students can gain helpful insights into their own career decision. In addition, a field trip or job site visit can be very motivational in that the student can readily observe how his/her vocational training will be used in the world of work (Sarkees & Scott, 1985).

9. **Use of media**. Utilizing media can embellish instruction by: (A) assisting the teacher in presenting the proficiency or skill requirements for a specific job, (b) reinforcing concepts presented in a classroom, laboratory, or demonstration activity, (c) providing a vehicle for special needs learners to show what they have learned, (d) providing a valuable source of remedial assistance, (e) providing simulated learning experiences, (g) allowing special needs students to learn through their strongest style, and (h) adding variety to the instructional program. Examples of media include: computer assisted instruction (CAI), 16 mm films, film strips, flip charts, overhead transparencies, tape recorders, records, posters, magazines, and diagrams (Sarkees & Scott, 1985).

10. **Use of student-teacher contracts**. Student-teacher contracts can be excellent tools in helping learners with special needs achieve their vocational goals. The following guidelines should be used in developing and implementing a student-teacher contract: (a) decide on the task or project, (b) specifically state the requirements, (c) determine the minimum acceptable accuracy, (d) set a time limit—initially, short assignments and short time periods are usually best, (e) identify consequences, (f) discuss contract with student and support personnel, (g) have all parties sign the contract, (h) positive reinforcement should be given if the terms of the contract are satisfactorily met, (i) uncompleted contracts should be analyzed by the teacher and student to determine the causes, and (j) develop new contracts cooperatively (Sarkees & Scott, 1985).

The following is a list of specific teaching strategies which educators can utilize when addressing the unique needs of handicapped students (Sarkees & Scott, 1985; Stern & Gathercoal, 1986: Tindall, 1980):

Important Note:	It is very important to note that many of these teaching strategies could be used for all students. Appearing later in this overview is a listing of instructional strategies which could be generic to all special needs students.

Instructing Students Who Are Mentally-Impaired

Involve as many different senses as possible in the learning process.

Use concrete specific terms rather than abstract terms. If necessary, have the student repeat the necessary information to you.

When giving written directions use lists instead of paragraphs. With regard to the student who can barely read, contact the remedial reading staff and arrange reading instruction. This instruction should focus on required reading for your course and that which is vital for employment.

Teach by demonstration (whenever possible). Don't hesitate to use hand-over-hand assistance in demonstrating how to use a tool or machine.

Allow time to practice machine or tool processes.

Break down complex operations into smaller tasks.

With regard to feedback, let the learner know what is wanted, and whether or not the student is achieving it. Give lots of positive reinforcement and encouragement. Nonverbal feedback is also helpful (i.e. touching the student or task, pointing, blocking or stopping an error as it is developing, and guiding the learner's movements. In addition, provide specific feedback with regard to the student's work. For example, the educator should say, "This piece was cut exactly to the right size," or "You put these two parts together correctly, " or use Mark Gold's expression "Try another way" (Gold, 1975).

Build the student's confidence by: (a) utilizing activities that will assure success, (b) assigning special tasks which will communicate with the educator's confidence in the student, (c) giving students an opportunity to correct their work and hand in a good project or assignment, and (d) displaying the student's good work.

In helping students with their ability to make correct discriminations, utilize Gold's "match to sample" technique in which the student is provided an example and a number of choices. The student will choose the correct alternative based upon the characteristics of the sample (Gold & Scott, 1971).

With regard to helping the student make correct discriminations when there are minimal differences between the stimuli, it may be necessary to: (a) present the choices in an easy form at first, (b) exaggerate attributes, (c) make the choices gradually harder, or (d) add and fade out color cue, add and then gradually remove large cue differences, or combine these two approaches.

Retention/memory can be improved by: (a) being systematic and presenting one new piece of learning at a time, (b) relating new material to familiar material, and keeping it practical and concrete, and (c) utilizing training techniques such as the total task method, chaining, modeling/demonstrating, and the structured overview (see Tindalls' Puzzled About Educating Special Needs Students).

"Generalizing", or having the student apply what has been learned to the contexts, can be improved by: (a) using examples from different relevant contexts and (b) practicing in settings similar to or exactly like those that will be encountered on the job.

Instructing Students Who Are Hearing-Impaired

In private, discuss with the student his/her ability to communicate with you (lip/speech reading, use of hearing aid, writing, signing, and total communication). An open discussion with the student which demonstrates your concern as an educator is an excellent beginning in building rapport.

Body language communicates messages too. Remember not to give mixed messages with your body language. Also, be alert to the body message the student is giving you (i.e., is he/she communicating tension, nervousness, avoidance, or confusion?)

If you will be working with an interpreter, do not instruct the deaf student as if he/she were a third party. Speak directly to the student. Also, remember that the interpreter is ethically bound to interpret everything you say. Therefore, sensitive or other issues concerning the student is best addressed in a meeting before or after class. If you are using media where the room must be darkened, focus a small lamp on the interpreter.

Maintain good eye contact with the student while speaking.

Speak slowly and clearly, pronouncing each word, but without exaggerating or over pronouncing.

Do not stand in front of a window while speaking. The light should be shining on your face and not the student's.

Try to rephrase a thought rather than saying the same words over again.

Encourage the student to read ahead on class material.

Try to keep the noise level down as much as possible in the class/laboratory.

Utilize handouts, the chalkboard, and other media.

Install a light to indicate when dangerous machinery is on.

Instructing Students Who Are Speech-Impaired

Always maintain eye contact and nod your head while the student is talking. This will help the student build confidence.

Work cooperatively with speech therapist and/or communication specialist to determine which technique will help most in assisting these students to communicate more effectively.

Encourage peer tutoring and small group activities to help the speech-impaired student develop interpersonal relationships with the other students.

Always allow sufficient time for the student to complete his/her sentence.

Try not to act uncomfortable when these individuals are communicating with you (i.e., discontinuing eye contact, shifting your position, clearing your throat). Your discomfort can be very discouraging to the student.

Do not require these individuals to present oral reports until they feel comfortable in the classroom environment.

Model correct sentence structure for the speech-impaired student so he/she can follow your example.

Develop a list of technical terms used in your class and share these terms with the speech specialist to help the student become more confident in pronouncing terms used in class.

Instructing Students Who are Visually Impaired

Orient the student to the classroom or laboratory before the course begins. Consistency and orderliness in the physical environment is very important to the visually-impaired student.

Arrange seating so the blind student will be able to hear the instruction and allow for the best distance and lighting conditions for the partially sighted student.

Provide as many opportunities as possible for the visually impaired student to observe closely or to touch the materials.

Give materials and handouts to the student ahead of time. Also, a student peer can assist visually-impaired student by making a carbon copy or a photocopy of their notes. Also, when possible, the educator can make a copy of their teaching notes. In this way the visually-impaired student can make a copy of their teaching notes. The visually-impaired student can review the materials with a tutor or have them transcribed into braille or taped.

It is important to gain and maintain the student's attention. Approval or disapproval will need to be verbalized.

Remember there is no need to talk louder to a visually-impaired student.

Rehabilitation counselors or special needs teachers can be useful resources in helping the student use commercial or modified learning aids or tools.

Tests may need to be prepared in large print, braille, on cassette tapes, or converted into exercises using the sense of touch. Also, it may be necessary to allow the student extra time to complete the test.

The tape recorder is the most frequently used technique for notetaking and preparing modified learning materials for the visually-impaired student.

The following is a sample of specially designed machines now available for the visually-impaired student: (a) OPTACON (Optical to Tacile Converter) allows students to read printed material, (b) STEREO-TONER is similar to the OPTACON but converts the printed word into a tone pattern, (c) OPTOPHONE and VISOTACTOR convert print into sound, and (d) KURZWEL READING MACHINE which converts standard English text on a computer into easily comprehended speech.

A number of general tools or aids which can assist the student in reading or writing lessons for vocational courses follow: (a) braille, (b) large print, (c) tape recorders, (d) talking books, (e) raised letters, (f) slate and stylus (used to make notes), (g) braille writer (a 6-key manually operated machine), (h) typewriters, (i) braille verifier (types braille and regular copy simultaneously), and (j) signature guides.

Aids for mathematics and computer programming courses follow: (a) abacus design for the blind, (b) raised clock faces, (c) wire geometrical forms, (d) braille rulers, (e) raised-line checkbooks, (f) raised-line boards, (g) braille dominoes, (h) braille flash cards, (i) cubes with raised braille dots used for simple mathematical problems, (j) raised-line paper or graphs, (k) computer terminals that use braille printers, or those that type braille and conventional type simultaneously, and (l) talking calculators.

Aids used frequently in other vocational courses include: (a) braille maps, charts, diagrams, (b) self-threading needles, (c) wooden or cardboard models of specimens that other students see through microscopes, (d) braille micrometers and other shop tools that have special raised markings, (e) braille demo tapes to mark lab equipment and models, (f) light probes with adible sounds that check the operating status of machines, and (g) guides or templates to help students align objects properly.

Instructing Students Who Are Seriously Emotionally Disturbed

Consult with the student's parents, special education teacher, or counselor to determine whether any particular teaching techniques will help or hinder learning.

Try to understand the student. Disturbing behaviors are the outward sign of inner turmoil.

Go easy on bad days and avoid direct confrontations that would aggravate the situation.

Communicate acceptance to the student and a willingness to help him or her succeed in class.

Provide immediate feedback and reinforcement.

Establishing a rapport and trust with the student is important.

In the beginning of the semester, help the student gain confidence by giving him or her lessons in which success can be achieved in a series of small steps.

A measure of privacy when the student attempts a new task can ease his or her embarrassment at any awkwardness or ineptness.

Allow the student to correct mistakes prior to turning in an assignment or project to ease any pressure.

Help the student not to overreact to failure and praise him or her for continuing to try.

Cue appropriate behavior in a quiet, unemotional manner.

In resolving discipline problems: (a) do so in privacy, (b) focus on objective facts in a calm, supportive tone, (c) actively listen to the student, (d) after listening to the student, reflect on what has been said, by telling the student what you've heard, (e) ask the student if he or she has any ideas about solving the problem (encourage the student to be specific), and (f) conclude with a clear understanding of the changes, time-frame, and benefits which are expected.

In handling aggressive behavior: (a) try to remain calm and model the controlled behavior which you desire, (b) intervene by either separating the individuals involved and having them work on another activity or having them take a time-out in separate corners of the room, (c) if necessary, send an uninvolved student to the office to get help, either in talking to the students or in managing the class while the teacher talks to them, and (d) return to normal classroom procedure as quickly as possible.

Access professional colleagues in special education evaluation, counseling, or therapy when the student's behavior appears to be in need of additional attention.

Instructing Students Who Are Orthopedically Impaired

In general, students with physical handicaps will be intellectually capable and able to participate in vocational programs.

Make the necessary modifications in classrooms, laboratories, equipment, building accessibility, and lavatories.

For notetaking the student can: (a) use a tape recorder, (b) have a classmate slip a carbon copy into his/her notebook to duplicate notes, and/or (c) have the instructor prepare an outline of the lecture.

For exams the instructor can: (a) give oral exams, (b) have the student dictate answers into a tape recorder or to another student, or (c) utilize a typewriter/computer if the student is able to type/keyboard.

Give the student more time to complete homework assignments. Also, giving the student advance notification of assignments is helpful.

In the laboratory, pair the student with one or more capable students in the class.

Enlarged copies of frequently used charts and diagrams posted near the student's desk eliminates the necessity of paging through a book.

Instructing Students Who Are Otherwise Health Impaired

Allow the students sufficient time for rest.

Seat the student in the most convenient place for easy access to necessary facilities (hall, lavatory, chalkboard, laboratory work stations).

Allow the students to work on program requirements at his or her own pace.

Tape lectures so the student can listen to them at home.

Work cooperatively with the health team to learn more about the student's special needs.

Utilize community resources personnel (social workers and itinerant teachers for home-bound students) for delivery of materials, assignments, and handouts.

Instructing Students Who Have Specific Learning Disabilities

Use visuals and demonstrations as often as possible.

Use concrete examples whenever possible.

Provide student with an outline of what will be covered in class.

Make sure all printed materials are clear and readable.

If the student has a visual perception problem, allow him or her to tape-record assignments.

Allow students to take tests orally or in a mode that compliments their performance.

Present new information in small amounts.

Make sure that writing assignments are relevant to the content of the program.

Allow students a longer period of time to complete assignments, if necessary.

List assignments in steps.

Task analysis can be used to lower the frustration level of these learners.

Programmed instruction materials can be very effective with these learners.

The following is a list of specific teaching strategies which can be very useful when working with students who have **limited English proficiency** (Sarkees & Scott, 1985):

Recognize the student's cultural background and allow for the student's individual differences.

Encourage these students to bring dictionaries to class.

Use demonstrations and hands-on experience as much as possible.

Speak slowly and use simple vocabulary and grammar.

Use bright felt tip markers to mark important words, passages, or illustrations.

If possible, use a translator for important concepts.

Work closely with LEP support personnel.

Keep homework assignments short.

Check for comprehension by asking the student what you have said.

Use simple sentences when writing test items so the student can concentrate on answering the question rather than deciphering it.

And finally, with regard to the disadvantaged population, typically these individuals dislike school, lack motivation, and have a low self-concept or esteem. Therefore, an educator's personal commitment and high expectations for the student may be two of the biggest single factors which will make a positive difference in this individual's life. Additionally, an educator's good example (i.e., being patient, understanding, well organized, and a good manager) can be extremely valuable in motivating and positively shaping the student's behavior (Baca, 1981). Vocational education can offer a great deal to the disadvantaged student in terms of teaching academic and social skills relative to the student's potential employment (Baca, 1981). The following are additional techniques or teaching strategies which can be very useful when working with disadvantaged students (Baca, 1981):

The educator should seek to understand the student's educational and social background through: (a) assessment information, (b) interaction with former teachers, (c) discussions with counselors, and (d) visits with parents to ascertain the student's social limitations and home situation.

Basic math, communication, and social skills should be reinforced. Math skills can be reinforced through hands-on learning activities. Communication skills can be improved by tactfully correcting poor grammar, when appropriate, and by providing resources that encourage reading in job related interests. Social skills such as getting along with people, grooming, proper dress, and respect for property and authority should be reinforced on a continual basis.

The importance of finishing school should be continually stressed. Relate acquisition of job skills to earn income.

Reinforce the student's feelings of self-worth by having high expectations for the student and by providing immediate reinforcement for work done well.

Simulate realistic job situations. All classroom and laboratory experiences should relate to employment in the occupation being studied.

Disadvantaged students (as all students) will typically react to the learning environment in a responsible and mature manner when they are treated with respect and as adults by the educator.

Classroom organization and discipline (being firm but not overbearing) are especially important. Generally, disadvantaged students want and need structure and discipline within their lives. Usually, these individuals will be responsive to and respect teachers who are firm, but sensitive.

Help the student develop employability and job coping skills (i.e., skills associated with finding, applying for, and retaining a job).

Help the student establish good work habits by keeping him or her involved with meaningful learning experiences. Each activity should have concrete learning objectives.

Disadvantaged students may need more encouragement to stay on task; however, they still should be required to complete all assignments (just as they will be required to do on the job).

Present instructions and information in clear, logical steps—building from the simple to the complex.

Technical terms should be communicated clearly and concisely and written in language which the students will understand.

Incorporate a variety of instructional methods in the curriculum (i.e., demonstrations, resource personnel, field trips, peer tutors, role playing, audio-visual aids, and on-site work experiences).

Present supplemental materials when appropriate. If such material is relevant to the acquisition of job skills, the student will not be humiliated by simplified material.

Highlight important parts of the student's text with a light marker to prevent the student from feeling overwhelmed with a larger volume of reading material.

Progress charts can be utilized to motivate disadvantaged students to master new skills.

Utilize flash cards (teacher made or commercial) to reinforce new terms and the use of tools and equipment.

When teaching special needs students, it is very important that instructors do not limit their instructional techniques. Therefore, the following abstract of instructional techniques or strategies has been prepared which could be considered generic to all special needs populations.

Involve as many different senses as possible

Use concrete terms

Have students repeat important information

Use lists rather than paragraphs for written directions

Teach by demonstration

Use hand-over-hand assistance when necessary

Allow practice time

Break complex operations into smaller tasks

Provide immediate feedback

Build confidence

Help student make correct discriminations

Help student with their retention/memory

Help student generalize knowledge

Build rapport

Use appropriate body language

Use appropriate techniques when working with an interpreter

Maintain good eye contact

Speak slowly and clearly

Rephrase thoughts when necessary

Encourage the student to read ahead

Keep the noise level down

Utilize various forms of media

Use lights to indicate when dangerous machinery is on

Work cooperatively with therapists

Encourage peer tutoring

Try not to act uncomfortable around special needs students

Help students feel comfortable

Model correct sentence structure

Develop a list of technical terms for students and/or therapists

Orient students before the course begins

Provide handouts ahead of time

Maintain student's attention

Use tape recorders for note taking

Try to understand the student

Communicate acceptance

Develop success experiences for the student

Use appropriate behavioral management techniques

Facilitate the students with their notetaking

Facilitate the students with exams

Pair students

Enlarge charts and diagrams

Use clear, readable visuals frequently

Provide an outline of material which is being taught

Writing assignments should be relevant

Use task analysis when necessary

Allow for individual differences

Encourage students to bring a dictionary

Use felt tip marker to highlight important parts

Do not make homework assignments too lengthy

Use simple sentences when writing test items

Reinforce basic education and work skills

Reinforce the importance of finishing school

Reinforce the student's feelings of self-worth

Simulate realistic job situations

Treat all students with respect and dignity

Provide structure and organization

Utilize progress charts

Utilize flash cards

Remediation in the Basic Education Skills

It is very important to note that some students may need to acquire one or more basic education skills (i.e., mathematics, reading, writing, speaking, listening, interpersonal relations, and/or reasoning skills) to succeed in vocational program. In addition, many employers will not hire an individual if he or she lacks these skills. Therefore, instruction in basic education skills may be necessary by the vocational educator. For information concerning basic or generalized skills instruction see Module 8.

Brown's 3-C Model

Brown's 3-C Model helps tie together many of the educational aspects discussed in this overview. In general, Brown suggests that when delivering instruction to learners with special needs, the instructor can enhance the student's success rate and reduce feelings of frustration by considering the following 3-Cs of instruction: (a) correction, (b) compensation, and (c) circumvention (Brown & Dayser, 1982):

Correction. Providing feedback when the student's skills are being developed, thereby, correcting inappropriate behaviors immediately after they appear. Employing remedial reading and math services to enhance the student's ability to function within the program.

Compensation. Helping the student realize that each task represents only one of many activities contained in the course and that weaknesses in one area can often be offset by strengths in other areas. It should be communicated to the student that some tasks are inherently difficult and that he/she should not expect to achieve success immediately. Further efforts to compensate for the student would be to modify or adjust the delivery of instruction to extend over segments of several class periods. In addition, reinforcement during the early stages of instruction should be amply provided.

Note: Basically, "compensation" involves the instructor's modifications to the curriculum, learning environment, and instruction which has been discussed in this overview.

Circumvention. If the vocational program is a way out of reach for a student, for example, due to a course requirement of a relatively high level of reading skill, it may become necessary for the student to "circumvent" this difficulty by discussing alternate training programs with a vocational counselor.

Summary

Modification of curriculum, learning environment, and instruction can be an important key to successful employment training for special needs students. It requires that the instructor know his/her content completely, but the benefits to all students will likely be extraordinary.

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COMPLIANCE STATEMENT

TITLE VI, CIVIL RIGHTS ACT OF 1964; THE MODIFIED COURT ORDER, CIVIL ACTION 5281, FEDERAL DISTRICT COURT, EASTERN DISTRICT OF TEXAS, TYLER DIVISION

Reviews of local education agencies pertaining to compliance with Title VI Civil Rights Act of 1964 and with specific requirements of the Modified Court Order, Civil Action No. 5281, Federal District Court, Eastern District of Texas, Tyler Division are conducted periodically by staff representatives of the Texas Education Agency. These reviews cover at least the following policies and practices:

(1) acceptance policies on student transfers from other school districts;

(2) operation of school bus routes or runs on a non-segregated basis;

(3) nondiscrimination in extracurricular activities and the use of school facilities;

(4) nondiscriminatory practices in the hiring, assigning, promoting, paying, demoting, reassigning, or dismissing of faculty and staff members who work with children;

(5) enrollment and assignment of students without discrimination on the basis of race, color, or national origin;

(6) nondiscriminatory practices relating to the use of a student's first language; and

(7) evidence of published procedures for hearing complaints and grievances.

In addition to conducting reviews, the Texas Education Agency staff representatives check complaints of discrimination made by a citizen or citizens residing in a school district where it is alleged discriminatory practices have occurred or are occurring.

Where a violation of Title VI of the Civil Rights act is found, the findings are reported to the Officer for Civil Rights, Department of Health, Education, and Welfare.

If there is a direct violation of the Court Order in Civil Action No. 5281 that cannot be cleared through negotiations, the sanctions required by the Court Order are applied.

TITLE VII, CIVIL RIGHTS ACT OF 1964; EXECUTIVE ORDERS 11246 AND 11375; TITLE IX, 1973 EDUCATION AMENDMENTS; REHABILITATION ACT OF 1973 AS AMENDED; 1974 AMENDMENTS TO THE WAGE-HOUR LAW EXPANDING THE AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967; AND VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1972 AS AMENDED IN 1974.

It is the policy of the Texas Education Agency to comply fully with the nondiscrimination provisions of all federal and state laws and regulations by assuring that no person shall be excluded from consideration for recruitment, selection, appointment, training, promotion, retention, or any other personnel action, or be denied any benefits or participation in any programs or activities which it operates on the grounds of race, religion, color, national origin, sex, handicap, age, or veteran status (except where age, sex, or handicap constitute a bona fide occupational qualification necessary to proper and efficient administration). The Texas Education Agency makes positive efforts to employ and advance in employment all protected groups.